IN THE CLAIMS:

Please rewrite claims 1, 9 to 10, 13 to 15, 33 and 35 to 36 and cancel claims 8, 11 to 12 and 37 to 38 without prejudice or disclaimer as follows:

1. (currently amended)

A method, comprising:

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defining an experimental space of a catalyzed chemical reaction to represent at least three factor interactions,

effecting a combinatorial high throughput screening (CHTS) method on the catalyzed chemical experimental space to produce results; and

analyzing the results according to matrix algebra to select a best case set of factor levels from the catalyzed experimental space (A) representing the results as an n x 1 matrix y where n = a number of factor level combinations in the experiment; (B) representing extents of the factor level combinations in an n x n matrix X; (C) solving n simultaneous equations represented by the matrices according to matrix algebra to form a results matrix β and

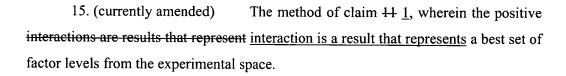
(i) representing the results matrix β as a normal probability plot; (ii) defining a standard deviation for a result of the plot wherein the standard deviation represents a probability that a result deviation from the standard is random and that a positive interaction can be identified outside of the deviation; and (iii) identifying the positive interaction outside of the standard deviation to identify an effect outside the standard deviation.

- 2. (original) The method of claim 1, wherein the experimental space is defined to represent all interactions of factors of the reaction.
- 3. (original) The method of claim 1, wherein the experimental space is defined according to a full factorial design.
- 4. (original) The method of claim 1, wherein the results from the matrix algebra analysis are represented according to a general linear model.

- 5. (original) The method of claim 1, wherein the experimental space is defined according to a full factorial design that represents at least 6 orders of interaction of factors of the reaction.
- 6. (original) The method of claim 1, wherein the experimental space is defined according to a full factorial design that represents at least 9 orders of interaction of factors of the reaction.
- 7. (original) The method of claim 1, wherein the experimental space is defined according to a full factorial design that represents all orders of interaction of factors of the reaction.

8. (cancelled)

- 9. (currently amended) The method of claim \$ 1, wherein (B) comprises coding extents of the factor level combinations as a + 1 or -1 and representing the coded extents as the n x 1 matrix y.
 - 10. (currently amended) The method of claim § 1, wherein (C) comprises:
 - (i) transposing matrix X to form matrix X';
 - (ii) postmultiplying X' by X to generate a matrix; and
 - (iii) postmultiplying the generated matrix by y to form the results matrix $\tilde{\Box}$
 - 11. (canceled)
 - 12. (canceled)
- 13. (currently amended) The method of claim $\frac{12}{1}$, wherein the probability is established at 95 percent or better.
- 14. (currently amended) The method of claim $\frac{12}{1}$, wherein the probability is established at 99.7 percent or better.



- 16. (original) The method of claim 15, wherein the best set of factor levels defines leads for a commercial process.
- 17. (original) The method of claim 15, wherein the best set of factor levels defines a space for further investigation by reiteration of a CHTS method.
- 18. (original) The method of claim 1, wherein the matrix algebra analysis comprises representing the results according to the following model equation (I)

$$y = X\beta + e$$
 (I)

where X is a matrix of factor and interaction levels in the experiment, y is a matrix of experimental results, β is effects and e is an error term of variance σ^2 from a normal distribution.

19. (original) The method of claim 18, wherein the matrix algebra analysis comprises assembling results as an n x 1 vector y, assembling factor level values into an n x k+1 matrix X, representing extents of the results and factor level values as +1's and – 1's accordingly and solving for effects parameters β according to the relationship:

$$\beta = (X'X)^{-1}X'y \tag{II}$$

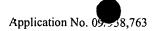
where superscript ' is a transpose of a matrix and superscript ' identifies an inverse function of a matrix.

- . 20. (original) The method of claim 19, comprising examining the solved effects parameters β to identify effects outside a standard deviation.
- 21. (original) The method of claim 20, further comprising reiterating the CHTS method wherein an experimental space for the CHTS method is selected according to the identified effects.



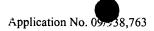


- 22. (original) The method of claim 1, further comprising applying a statistical analysis to the results to identify interactions that represent a best set of factor levels from the experimental space.
- 23. (original) The method of claim 1, wherein the CHTS comprises effecting parallel chemical reactions of an array of reactants defined as the experimental space.
- 24. (original) The method of claim 1, wherein the CHTS comprises effecting parallel chemical reactions on a micro scale on reactants defined as the experimental space.
- 25. (original) The method of claim 1, wherein the CHTS comprises an iteration of steps of simultaneously reacting a multiplicity of tagged reactants and identifying a multiplicity of tagged products of the reaction and evaluating the identified products after completion of a single or repeated iteration.
- 26. (original) The method of claim 1, wherein the experimental space factors comprise reactants, catalysts and conditions and the CHTS comprises
- (A) (a) reacting a reactant selected from the experimental space under a selected set of catalysts or reaction conditions; and (b) evaluating a set of results of the reacting step; and
- (B) reiterating step (A) wherein a selected experimental space selected for a step (a) is chosen as a result of an evaluating step (b) of a preceding iteration of step (A).
- 27. (original) The method of claim 26, wherein the evaluating step (b) comprises identifying relationships between factor levels of the candidate chemical reaction space; and determining the chemical experimental space according to a full factorial design for the next iteration.
- 28. (original) The method of claim 26, comprising reiterating (A) until a best set of factor levels of the chemical experimental space is selected.



- 29. (original) The method of claim 1, wherein the chemical space includes a catalyst system comprising a Group VIII B metal.
- 30. (original) The method of claim 1, wherein the chemical space includes a catalyst system comprising palladium.
- 31. (original) The method of claim 1, wherein the chemical space includes a catalyst system comprising a halide composition.
- 32. (original) The method of claim 1, wherein the chemical space includes an inorganic co-catalyst.
- 33. (currently amended) The method of claim 1, wherein the chemical space includes a catalyst system that includes a combination of inorganic co-catalysts.
- 34. (original) The method of claim 1, wherein the defined space comprises a reactant or catalyst at least partially embodied in a liquid and effecting the CHTS method comprises contacting the reactant or catalyst with an additional reactant at least partially embodied in a gas, wherein the liquid forms a film having a thickness sufficient to allow a reaction rate that is essentially independent of a mass transfer rate of additional reactant into the liquid to synthesize products that comprise the results.
- 35. (currently amended) A method of conducting an experiment, comprising steps of:
- (A) conducting a CHTS experiment on a complex experimental space comprising qualitative and quantitative factors to produce first data results;
- (B) analyzing the first data results according to matrix algebra (i) representing the results as an $n \times 1$ matrix y where n = a number of factor level combinations in the experiment; (ii) representing extents of the factor level combinations in an $n \times n$ matrix X; (iii) solving n simultaneous equations represented by the matrices according to matrix algebra to form a results matrix β ;





- (C) (i) representing the results matrix β as a normal probability plot; defining a standard deviation of the analyzed results and (ii) defining a standard deviation for a result of the plot wherein the standard deviation represents a probability that a result deviation from the standard is random and that a positive interaction can be identified outside of the deviation;
 - (D) selecting data results that positively exceed the standard deviation,
 - (E) defining a next experimental space according to the selected data results; and
- (F) reiterating steps (A) through (E) on the next experimental space until data results selected in step (D) represent satisfactory leads.
- 36. (currently amended) A system for investigating a catalyzed experimental space, comprising;

a reactor for effecting a CHTS method on the catalyzed chemical experimental space to produce results; and

a programmed controller that analyzes the results according to matrix algebra to select (A) represents the results as an n x 1 matrix y where n = a number of factor level combinations in the experiment; (B) represents extents of the factor level combinations in an n x n matrix X; (C) solves n simultaneous equations represented by the matrices according to matrix algebra to form a results matrix β ; (D) represents the results matrix β as a normal probability plot; (E) defines a standard deviation for a result of the plot wherein the standard deviation represents a probability that a result deviation from the standard is random and that a positive interaction can be identified outside of the deviation; and (F) identifies the positive interaction outside of the standard deviation to identify an effect outside the standard deviation that represents a best case set of factor levels from the catalyzed experimental space.

- 37. (canceled)
- 38. (canceled)



- 39. (original) The system of claim 36, wherein the controller is a computer, processor or microprocessor.
- 40. (original) The system of claim 36, further comprising a dispensing assembly to charge factor levels of reactants or catalysts representing the catalyzed chemical experimental space to wells of an array plate for charging to the reactor.
- 41. (original) The system of claim 39, comprising a programmed controller to define the catalyzed chemical experimental space and to control the assembly to charge factor levels of reactants or catalysts according to the controller defined space.
- 42. (original) The system of claim 36, further comprising a detector to detect results of the CHTS method effected in the reactor.

